REMARKS

Reconsideration of the rejection of the subject matter of this application is requested.

Status of Claims

Claims 2, 3, and 6-11 remain for consideration. Claims 1, 4, and 5 have been canceled. The independent claims are new claim 6, drawn to a process for making optical fiber, and claim 8, drawn to a process for making optical fiber preforms.

The Drawing

The drawing or the specification is objected to since reference number 22 appears in Fig. 5 but not in the specification. Applicants submit herewith a substitute page including a corrected Fig. 5, with reference number 22 removed.

Rejections On Prior Art

Claims 1-3 stand rejected under 35 U.S.C. 102(b) as anticipated by the Kyoto et al. '428 patent.

Claims 1-3 stand rejected under 35 U.S.C. 102(b) as anticipated by the Kyoto et al. '943 patent.

Claims 4 and 5 stand rejected under 35 U.S.C. 103(a) as obvious in view of the Kyoto et al. '428 patent.

Argument

The Kyoto '428 patent is directed to conventional equilibrium doping. The Tables in the patent show the approximate equilibrium values corresponding to various partial pressures. For a SiF_4 partial pressure of 0.1 atmosphere, Table 1 in the patent shows a delta n of –0.42%. Compare this with applicants' Example 1 where the use of a partial pressure of 0.1 atmosphere produces a delta n of less than –0.3%. In applicants' Example 2, the difference is even greater. A delta n of less than -0.15% is produced using a SiF_4 partial pressure of 0.1 atmosphere.

The patent teaches an equilibrium doping process wherein the doping step involves heating the porous body to a high temperature (up to 1400 ^{O}C), exposing it to SiF_4, and waiting for the reaction of SiO_2 and SiF_4 to occur. While the lengthy reaction times are not stated in the patent, col. 6, lines 27-31 describes the equilibrium process.

Further evidence that the patent teaches approximately equilibrium doping is the equilibrium equation at line 32, col. 4. This teaches controlling the partial pressure of SiF_4 to nearly the equilibrium value (the equilibrium value taught by applicants is given in equation (1) on page 8 of applicants' specification, i.e.

$$\Delta n \sim p^{\frac{1}{4}}$$

The prescription for the partial pressure that is given in the patent, i.e.

$$\Delta n = 0.75\, p^{\frac{1}{4}}$$

teaches that the partial pressure may exceed the equilibrium partial pressure slightly, i.e. by 1/0.75 = 1.33%, an excess of 33%.

The incremental doping process claimed by applicant has these important

differences. First, in the incremental doping process, a very large excess of F is predeposited on the silica particles at the F deposition temperature. The deposition temperature is below 1000 ^{O}C. At this relatively low deposition temperature, the process, including the overall deposition amount, is relatively well controlled. As deposition temperatures increase above 1000 ^{O}C, control of the process suffers. Therefore, goals of the incremental doping technique are to keep good process control, as well as to shorten the process. To shorten the process, F is deposited at low temperature (below 1000 ^{O}C) in very large quantities. These quantities are far larger than the equilibrium quantity where reaction between SiO_2 and SiF_4 is complete. Much of the F in this step is simply absorbed into the surface of the particles, not fully reacted. This process is illustrated in applicants' Figs. 5-8. In the main claim as amended, this excess of F results from a deposition step that uses a partial pressure of at least five times the equilibrium partial pressure. This is set forth in the passage beginning at line 25 on page 9 of applicants' specification. In terms of the equilibrium equation this would appear as:

$$\Delta n < 0.2\, p^{\frac{1}{4}}$$

Another difference is the use of use of a drive-in step, the step that shortens the process, in an atmosphere that is devoid of F. Since the drive-in temperature is high, to promote diffusion of the excess F absorbed in the deposition step, further doping (doping in a relatively uncontrolled regime,as described above) is avoided by removing the porous body from the SiF_4 atmosphere. In the process described in Kyoto et al. patent, the porous body is

heated in the SiF_4 atmosphere (see col. 7, lines 46, 47 of the patent).

In the claims as amended, the drive-in step, which is important, is in dependent claims, claims 7 and 9. This is because the main claim already has two features that should easily distinguish the claims from prior art relied on. (They are the excess - five times - of fluorine partial pressure, and maintaining the deposition step at a temperature below 1000 ^{O}C.) However, in view of the significant limitations in claims 7 and 9, special emphasis is placed on the claimed combination of features set forth in these claims.

Claims 1-3 also stand rejected on the Kyoto et al. '943 patent. Reference to Fig. 7, made by the Examiner, reveals that all of the processing occurs at temperatures above that claimed by applicants, a temperature regime that makes control of doping levels, especially low doping levels, difficult to control.

In view of the amendments and these remarks, reconsideration and allowance of claims 5 is requested.

In the event that the Examiner concludes that a telephone call would advance the prosecution of this application, the Examiner is invited and encouraged to call the undersigned attorney at Area Code 757-258-9018.

Respectfully,

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